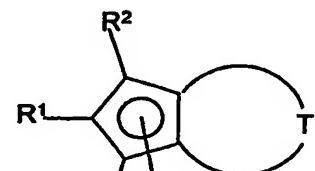


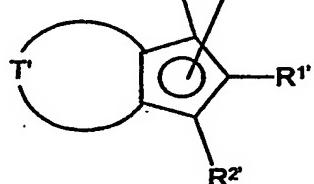
We claim:

1. A transition metal compound of the formula (I)

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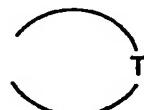
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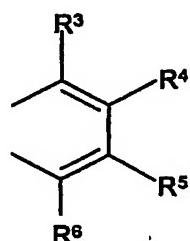
where

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is

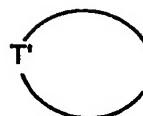
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and

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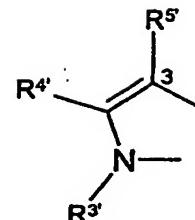
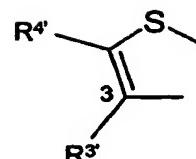
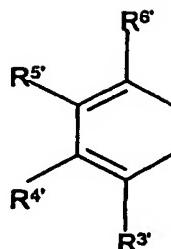


is a divalent group such as

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and

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 M^1 is titanium, zirconium or hafnium; R^1, R^2 are identical or different and are each a C₁-C₂₀ group; R^1, R^2 are identical or different, identical to or different from R^1 or R^2 and are each hydrogen or a C₁-C₂₀ group;

15 R^3 is a C₆-C₁₈-aryl group or C₄-C₁₈-heteroaryl; or a fluorinated C₆-C₂₀-aryl or C₇-C₂₀-alkylaryl, where the aryl part of these groups may bear one or more linear or branched C₁-C₁₈-alkyl, C₁-C₁₈-alkoxy, C₂-C₁₀-alkenyl or C₃-C₁₅-alkylalkenyl groups as substituents, or R^3 together with R^4 forms a monocyclic or polycyclic ring system which may in turn be substituted;

20 R^3 is hydrogen or a C₁-C₄₀ group or R^3 together with R^4 forms a monocyclic or polycyclic ring system which may in turn be substituted;

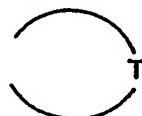
 R^4, R^4' are identical or different and are each hydrogen or a C₁-C₂₀ group; R^5, R^5', R^6, R^6' are identical or different and are each hydrogen or a C₁-C₂₀ group;

25 R^7 is a bridging structural element between the two indenyl radicals and is selected from the $M^2R^{10}R^{11}$ group, where M^2 is silicon, germanium, tin or carbon and R^{10} and R^{11} may be identical or different and are each hydrogen or a C₁-C₂₀-hydrocarbon-containing group;

30 R^8, R^9 may be identical or different and are each halogen, linear or branched C₁-C₂₀-alkyl, substituted or unsubstituted phenoxide, or R^8 and R^9 are joined to one another and form a monocyclic or polycyclic ring system which may in turn be substituted.

2. A transition metal compound as claimed in claim 1, wherein

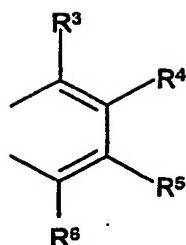
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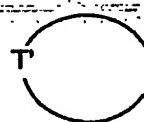
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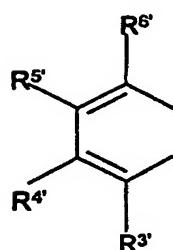
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where the substituents R³ to R⁶ and R^{3'} to R^{6'} are defined as for formula (I).

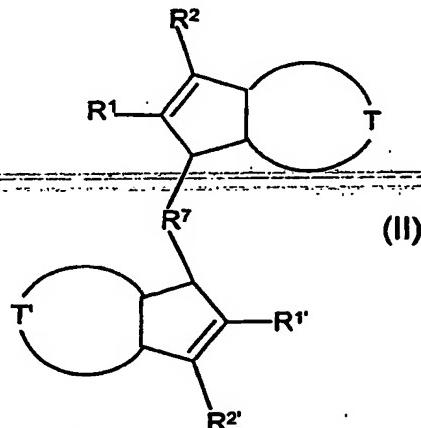
3. A transition metal compound as claimed in claim 1 or 2, wherein

M¹ is zirconium;R¹, R² are identical or different and are each a C₁-C₁₂-alkyl group;R¹, R² are identical or different and are each hydrogen, methyl, ethyl, n-propyl, isopropyl, n-butyl, isobutyl, tert-butyl, cyclopentyl or cyclohexyl;R³, R^{3'} are identical or different and are each a C₆-C₁₈-aryl group or two radicals R³ together with R⁴ and/or R^{3'} together with R^{4'} may form a monocyclic or polycyclic ring system which may in turn be substituted, and R³ may also be hydrogen;R⁴, R^{4'} are identical or different and are either hydrogen or R⁴ together with R³ and/or R^{4'} together with R^{3'} form a monocyclic or polycyclic ring system;R⁵, R^{5'}, R⁶, R^{6'} are identical or different and are each hydrogen, linear or branched C₁-C₁₈-alkyl, C₂-C₁₀-alkenyl or C₃-C₁₅-alkylalkenyl; C₆-C₂₀-aryl, C₄-C₁₈-heteroaryl, C₇-C₂₀-arylkyl; or fluorinated C₁-C₁₂-alkyl, C₂-C₁₀-alkenyl, C₆-C₂₀-aryl or C₇-C₂₀-arylkyl;

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R^7 is a bridging structural element $SiR^{10}R^{11}$ and R^{10} and R^{11} are identical or different and are each a C₁-C₂₀-hydrocarbon-containing group and
 R^8, R^9 are each chlorine or methyl.

5 4. A ligand system of the formula (II) or its double bond isomers;

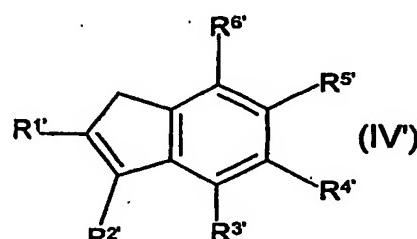
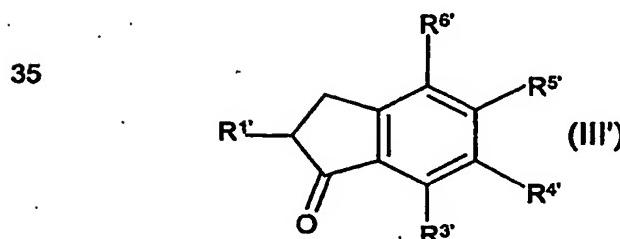
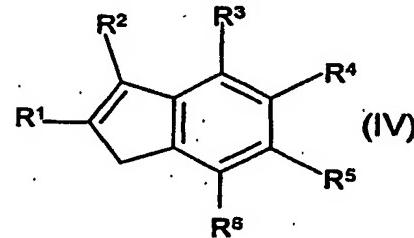
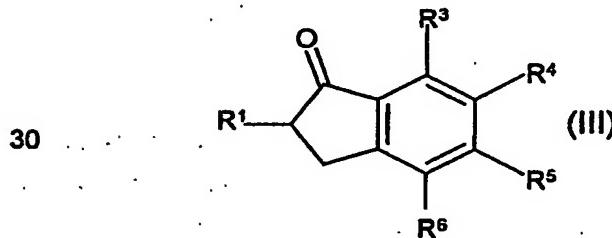


where the variables are as defined for formula (I).

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5. A process for preparing ansa-metallocenes of the formula (I), which comprises the following steps:

- a) reaction of a 1-indanone of the formula (III) or (III') with an organometallic compound $M^3R_{m}^2Hal_n$ or $M^3R_{m}^2Hal_n$ and subsequent elimination to form the substituted indene of the formula (IV) or (IV'),



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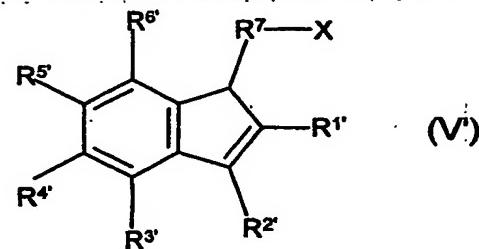
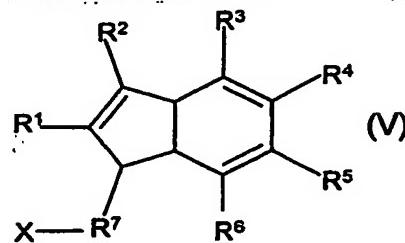
where the variables R^1 , $R^{1'}$, R^2 , $R^{2'}$, R^3 , $R^{3'}$, R^4 , $R^{4'}$, R^5 , $R^{5'}$, R^6 and $R^{6'}$ are as defined for formula (I), M^3 is an alkali metal, an alkaline earth metal, aluminum or titanium, Hal is halogen, m is an integer and is equal to or greater than 1 and the sum of $m+n$ corresponds to the valence of M^3 ;

5

- b) deprotonation of the substituted indene of the formula (IV) or (IV') and subsequent reaction of the deprotonated indene with compounds of the type R^7X_2 to form compounds of the formula (V) or (V') or their double bond isomers,

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where X is Cl, Br, I or O-tosyl and R^7 is as defined for formula (I);

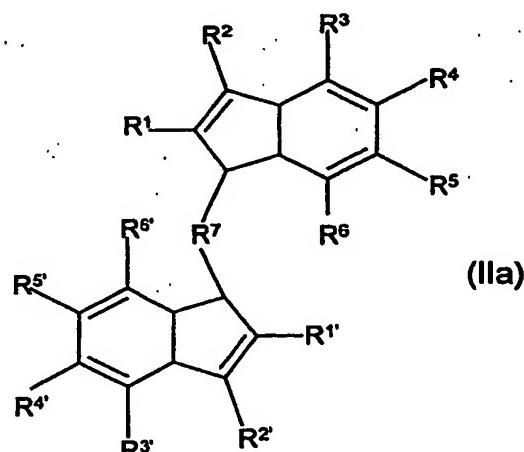
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- c) reaction of the compound of the formula (V) or (V') with a further deprotonated indene which has been obtained by deprotonation of (IV) or (IV') to form the ligand system of the formula (IIa) or its double bond isomers,

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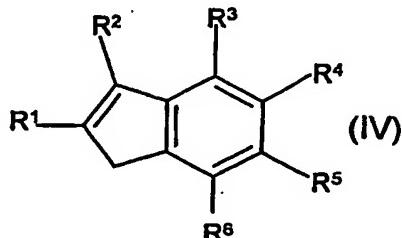


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- d) deprotonation of the ligand system of the formula (IIa) or its double bond isomers and reaction with compounds of the type $X_2M^1R^8R^9$ to give the ansa-metallocene of the formula (I), where X is as defined for formula (V) and M^1 , R^8 and R^9 are as defined for formula (I).

6. An indene of the formula (IV) or its double bond isomer,

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where

R^1, R^2 are identical or different and are each a C_1-C_{20} group;

R^3 is a C_6-C_{18} -aryl group or C_4-C_{18} -heteroaryl; or a fluorinated C_6-C_{20} -aryl or C_7-C_{20} -alkylaryl, where the aryl part of these groups may bear one or more linear or branched C_1-C_{18} -alkyl, C_1-C_{18} -alkoxy, C_2-C_{10} -alkenyl or C_3-C_{15} -alkylalkenyl groups as substituents;

R^4 is hydrogen or a C_1-C_{20} group;

R^5, R^6 are identical or different and are each hydrogen or a C_1-C_{20} group.

20 7. A catalyst system comprising one or more compounds of the formula (I) as claimed in any of claims 1 to 3 and one or more cocatalysts and/or supports.

8. The use of a catalyst system as claimed in claim 7 for the preparation of a polyolefin, in particular a copolymer of various olefins.

25

9. The use of a compound of the formula (I) as claimed in any of claims 1 to 3 for the preparation of a polyolefin, in particular a copolymer of various olefins.

10. The use as claimed in claim 8 or 9 for the preparation of ethylene-propylene copolymers.

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11. A process for preparing a polyolefin by polymerization of one or more olefins in the presence of one or more compounds of the formula (I) as claimed in any of claims 1 to 3.

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